A FOSSIL OWL FROM THE BRIDGER EOCENE.

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In 1873, Dr. Joseph Leidy described some fragments of bone, supposed to be those of a large lizard from the Bridger deposits of Wyoming as *Saniwa major*, basing this name on the distal end of a humerus and two fragmentary vertebrae. The type specimens preserved in the collections of the Academy of Natural Sciences of Philadelphia were borrowed recently by Mr. C. W. Gilmore, who had recognized that the type material was probably composite, and to him and to Dr. Witmer Stone, I am indebted for permission to study the humerus in question, which proves to be that of a bird.

Though Dr. Leidy considered this humerus as lacertilian, and compared it with that of a monitor, it is readily seen that it does not belong in this group as there is no sign of an epiphysis on the articular end of the bone. The specimen is well fossilized, and is dark green in color save along the condyles, where it is lighter and has a somewhat chalky appearance, a circumstance that perhaps led to its allocation in the Sauria, as it may have been thought that this lighter area was epiphysial in character.

The two broken vertebrae mentioned must stand as the type of *Saniwa major* Leidy and are hereby so designated. The avian humerus, representing an owl of the family Bubonidae, may be known as

Minerva saurodosis sp. nov.

Characters.—Distal end of humerus (figs. 1 and 2) similar in general form to *Bubo virginianus* (Gmelin) but smaller, with radial and ulnar trochleae reduced in size; ulnar trochleae less produced distally toward outer end; angle at base of ulnar condyle on inner anterior face sloping gently (not abrupt); surface above entepicondylar process broader, less elevated, sloping gradually into brachial depression; entepicondylar process slighter, lateral margin of bone above ectepicondylar process relatively less broadened, with more rounded margins, expanding to support entepicondyle; shaft expanding somewhat to support ectepicondylar process.

Description.—Type, Acad. Nat. Sci. Philadelphia, no. 9131, distal end of left humerus, from near "Lodge-Pole Trail Crossing Dry Creek," about ten miles from Fort Bridger, Wyoming; Eocene

(Bridger formation), collected by Dr. James Van A. Carter, between 1869 and 1872.

A bird slightly larger than the Barred Owl, *Strix varia* Barton; smaller than the Great Horned Owl, *Bubo virginianus* (Gmelin).

Distal end of humerus much expanded as in other owls, the diameter across the condyles nearly twice that of the shaft; end of ectepicondylar process broken away, the shaft sloping out to support base of process; lateral epicondyle produced, shelf-like, between base of ectepicondylar process and radial trochlea, confluent inwardly with base of shaft, with outer margin below ectepicondylar process raised so that the shelf appears excavated (concave), changing outwardly to a shallow groove delimiting the external face of the radial trochlea and disappearing as it comes to the summit of the articular surface; radial trochlea short, roundly elevated, slightly sigmoid in outline, bulging over shelf of lateral epicondyle, sharply declivous on opposite side, at inner end forming a right angle with shaft; ulnar trochlea relatively small, not abruptly elevated above shaft on inner side (articular surface slightly weathered away so that a slight angular tip was formerly present), slender toward outer margin, so that rounded articular head is reduced; intertrochlear groove narrow, with sharp slope toward radial side and more gradual one opposite toward ulnar trochlea; attachment for pronator brevis extensive, roughly elliptical in outline, relatively more extensive than in modern owls as it is nearly as long as globular portion of ulnar trochlea; attachments for pronator longus and flexor carpi ulnaris roughly rounded, well impressed; outer face of median epicondyle expanded on both margins, appearing as a somewhat elliptical expansion at lower end of shaft, slightly impressed on outer face above base of entepicondylar process; depression for brachialis inferior distinct but only slightly impressed, more distinct toward ulnar margin; olecranal depression fairly deep, abruptly delimited against median epicondyle, with extent less sharply cut off by expansion of ulnar trochlea, merging imperceptibly into shaft forward; sulcus anconei lateralis narrow, shallowly and regularly concave, disappearing after leaving lateral epicondyle; sulcus anconei medius broad, divided into two unequal parts by a slightly raised line passing from upper margin of olecranal fossa obliquely to margin of shaft at point where the lateral epicondyle tapers gradually into straight shaft; bone hollow.

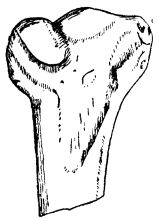

FIG. 1. *Minerva sauro-dosis.* Anterior view of type.

FIG. 2. *Minerva sauro-dosis.* View of condyles.

Measurements (in millimeters).—Lateral breadth of shaft above depression for brachialis inferior 8.5; breadth across distal end 18.7;

extreme length of radial trochlea 7.8; greatest length of attachment for pronator brevis 6.

Range.—From Bridger formation, Eocene, near Fort Bridger, Wyoming.

Remarks.—The broken humerus described above, here exhumed from a resting place among its cold-blooded relatives, the lizards, represents an owl smaller than *Bubo virginianus*, similar in size to *Pulsatrix perspicillata* (Latham), that does not resemble closely any existing genus of modern North American owls but in a way combines characters pertaining to several. *Minerva saurodosis* was apparently a bird of moderate flight, as processes for muscle attachment, while strong, are not rugged as they are in the Great Horned and Snowy Owls that perform extended migrations. In general outline the humerus of *M. saurodosis* suggests that of *Bubo* but with the processes and tubercles developed even to a less degree than in the Barred Owl, Spotted Owl, or *Pulsatrix perspicillata*. It is judged that it may have been a resident species.

The generic allocation of this ancient owl is more or less tentative. In 1913, Dr. R. W. Shufeldt[1] described as *Aquila antiqua* the hind claw of a bird collected August 4, 1905, by W. J. Sinclair in the Bridger formation at Church Buttes, Wyoming. Later[2], Dr. Shufeldt, after study of further material, decided that this species should be relegated to the owls and set up the genus *Minerva* to receive it. The species, of a size much larger than any existing North American Owls, was characterized by the great prolongation of the dorsal articular surface of the hind claw. This upper angle projects until the articular facet forms almost half of a circle. This character, while more pronounced in owls than in other groups that I have examined (much more than in available Accipitriformes) reaches a development in *Minerva* far beyond that of any modern owl that I have seen. To allow flexibility in movement it must have been received in a deeper pit than ordinary on the distal end of the digital phalanx. Otherwise the hind claw would have had little power of backward flexion. A structure similar to this type of articular facet would be formed by ankylosis of the sesamoid found at the upper end of the claw articulation in many lizards, with the end of the bone.

[1] Bull. Am. Mus. Nat. Hist., Vol. XXXII, Aug. 4, 1913, p. 297.
[2] Trans. Connecticut Acad. Arts Sci., Vol. 19, Feb., 1915, p. 43.

As *Minerva antiqua* represents a specialized type of owl from the Bridger formation it seems more logical at present to describe the present species, also a peculiar form from the same deposits, in the genus *Minerva* than to erect for it a new genus. With further material the two may be found widely and trenchantly separated. For the present, *Minerva saurodosis* is to be distinguished from *M. antiqua* by its much smaller size. Strangely enough *M. saurodosis* as represented by this broken humerus has little resemblance to *Tyto*, a possible indication of the archaic origin of the Barn Owl, while to go farther afield it shows little to suggest any of the Goatsuckers or the Oil-bird (*Steatornis*). In other than generalized group resemblances there is in fact slight connection evident between it and any of the other Coraciiform suborders. There are certain resemblances to the Anisodactylae (Kingfishers, Todies, Motmots, etc.), as well as to the superfamily Galbuloidae of the Picariae, containing the Jacamars and Puff-birds, but these similarities are not close.